Hot news from the cold continent

Description

In the stratosphere high above the Antarctic continent the winds of change are threatening to create a weather pattern likely to affect the southernmost extremities of southern hemisphere land masses.

The stratosphere above the South Pole is rapidly becoming ‘hot news’ as meteorological interest is focused on a sudden stratospheric warming (SSW) event that has raised the temperature by 40-50 degrees C, promising to disrupt weather patterns as far away as southern Australia and Patagonia, in South America.

In the northern hemisphere, these SSW events are relatively frequent and such an event led to the ‘Beast from the East’ last winter and early spring. This ultimately brought a stream of intensely cold air to the UK and north-western Europe from as far as Arctic Siberia.

Now, the Antarctic continent is undergoing a similar sequence of events to what happened in the northern hemisphere last year, involving a complete breakdown of the southern stratospheric polar vortex, followed by a massive rise in temperature high up in the stratosphere.

Long-range forecasts showed that an SSW event was likely during late September.

How often do we have these events?

SSW events are a natural feature of the atmosphere but it is difficult to estimate how often such a rare event like this occurs. Our computer models have raised the prospect of its potential occurrence in the past when we have occasionally seen SSW events in computer model simulations of the polar vortex in the southern hemisphere. However, it was only in 2002 when the only other event on record occurred in the real world that we realised that the computer models were alerting us to a real possibility. Professor Adam Scaife said: “These events are rare in the southern hemisphere but we recently analysed thousands of computer simulations to calculate the chance of a second sudden stratospheric warming in the southern hemisphere and we now know that it is about four per cent per year, so it is likely to occur on average about once every 25 years.”

What does this mean for the weather?

The change in the stratospheric winds burrows down with time and on reaching the tropopause – the layer separating the higher stratosphere from the lower troposphere – it is followed by a change in the southern hemisphere jet stream which is expected to shift towards the equator.

Harry Hendon is a senior principal research scientist at the Bureau of Meteorology in Melbourne. He said: “We’re not really anticipating impacts until October and maybe extending through to January. So typically what happens is the westerly jet stream shifts towards the equator. So in those locations that pretty much sit right underneath the westerly jet stream – like the southern part of the South Island of New Zealand or Patagonia in South America – they can expect to see enhanced storminess and more clouds and more rainfall.”

Harry added: “Our modelling capability here – where we’ve been anticipating what’s going to happen both in the short term and long term – really depends on our partnership between the Bureau of Meteorology and the UK Met Office. We share the same modelling capability and it’s a really good example of the benefit of this long-running partnership that the Bureau of Meteorology has had with the Met Office.”

Although there is likely to be weather disruption in parts of the southern hemisphere, there is some good news in that the ozone hole is likely to temporarily shrink this year with the benefit that there will be less ultraviolet radiation reaching the Earth’s surface.

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Climate change: how can the maritime industry be more resilient?

Description

As a maritime nation, the sea has been an integral part of our heritage. But with climate change increasingly impacting the UK, the Met Office's Tom Butcher examines how maritime industries will cope.

As a maritime nation, the sea has been integral to our heritage. NLV Pharos, next to HMS Belfast, made an apposite venue to discuss the future impacts of climate change on the marine sector. Photos: Simon Hammett, Met Office

With 80% of the volume of world trade carried by sea, international shipping and ports play a critical role in global supply-chains enabling countries to access global markets. In addition, offshore oil and gas – and increasingly offshore wind energy – play essential roles in meeting global energy demand.

Climate change will cause sea-levels to rise dramatically throughout the 21st Century, regardless of mitigation efforts, and coupled with this, coastal and offshore infrastructure is also vulnerable to changing patterns of storm conditions. So adaptation strategies for offshore, maritime transport and ports industries will be crucial in limiting the impacts of the changing climate on the global economy.

But how resilient are the UK's maritime industries to today's weather extremes; and how well are they adapting to future climate change? To explore these issues we brought together senior cross-industry professionals, as well as government and other stakeholders during London International Shipping Week.

Met Office CEO, Penny Endersby stresses the key role the Met Office plays in linking weather and climate

A seminar was hosted on board the Northern Lighthouse Board's supply ship NLV Pharos, moored alongside HMS Belfast on the Thames, -an apposite location given the river's long and proud history as a vital hub for UK shipping and trade.

Baroness Brown of Cambridge – Chair of the Adaptation Committee of the Committee on Climate Change

The event was opened by Nusrat Ghani MP the Parliamentary Under Secretary of State with responsibility for maritime issues. Baroness Brown of Cambridge (pictured above) set the scene by presenting her perspective as Chair of the climate adaptation committee of the Committee on Climate Change.

Met Office Chief Scientist, Professor Stephen Belcher, provided an update on the latest understanding of weather and climate science, and four panel speakers – representing different parts of the maritime sector – gave their perspectives on how well adapted their organisations were to climate change. Round-table discussions allowed all delegates to share their perspectives on the topic.

Some key themes emerged:

Improving access to and availability of data

A number of organisations within the ports, shipping and offshore sectors are undergoing digital transformations utilising connected technologies. This creates new opportunities for the use of weather information alongside asset and operational data in new and exciting ways to increase automation and improve efficiency. To fully realise this opportunity,industries need to explore new ways of sharing the huge amounts of valuable and available data. It was highlighted that it may take some time for the benefits of these technologies to be realised by smaller port and ship operators who may have ageing infrastructure and lack the deep pockets to fund technology investment.

Incentives for adaptation

Many of the commercial organisations represented recognised the need to adapt to climate change, but expressed some scepticism about how this might be achieved given the economic constraints on their business which may prevent taking a very long-range view. During his presentation, James Trimmer, from the Port of London Authority (PLA), identified some ways through which this could be overcome. The PLA conducted a climate-risk assessment as part of a response to government for the Adaptation Reporting Power. The PLA was aware of some key weather and climate issues on the river such as sea-level rise, fog and wind; but until completion of its latest adaptation report it had not considered the risks associated with peak flow on navigation on the upper Thames. As a result, they established a warning system for the safety of rowers on the river, and this was almost immediately put to the test during sustained flood conditions in January and February 2014, resulting in an immediate benefit.

An interdependent approach

Baroness Brown of Cambridge identified the importance of interdependencies between industries and adaptation in her presentation, and this was echoed by participants during some of the following round-table discussions. For example, the tidal surge that affected the east coast during December 2013 caused direct impacts such as closure and overtopping of some ports and harbours, and the diversion of many ships. However, some of the problems experienced by port and ship operators were secondary, caused by flooding of power stations or the inability of staff to get to work due to the associated windstorm and inland flooding of roads. It is only by putting those adaptation strategies in place that strengthen supporting value chains – as well as key coastal and offshore infrastructure – that maritime industries will be resilient.

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Zooming in on climate forecasts: the launch of UKCP Local (2.2km)

Description

Met Office
How CC Advisors Help
Building professional and strong working relationships with local, regional and national resilience community including Government and Cat I and II Responders
Responding to major incidents
Planning, risk assessment and
Cabinet Office Briefings up to
Raising awareness and
can create/influence emergency
incidents
Raising levels of understanding

Earlier this week, the Met Office, BEIS, Defra and the Environment Agency launched the latest component of the UKCP climate projections, 12 projections of how the future climate could evolve, using a climate model resolution of 2.2km. Press release here.

Professor Jason Lowe, who has been leading the project for the Met Office, said: “Across the UK, we have all become accustomed to seeing very spatially-detailed models for weather forecasting a few days ahead: this new set of projections applies similar – kilometre-scale detail – to climate projections, several decades into the future. It provides users of the data with the most detailed glimpse of the future, enabling them to make informed decisions about how to plan for what could be some of the most damaging impacts of climate change.”

At a packed event in London, invited guests – including representatives from the user groups who helped with the development of UKCP – heard a range of speakers examine the capability of the latest phase of UKCP data, known as UKCP local (2.2km).

Dr Lizzie Kendon, a climate scientist with the Met Office, explained some of the benefits of this higher resolution. She said: “By working at a finer scale, we’re more clearly able to model for certain geographical features, such as mountains, coastlines and built-up areas to see how these can influence weather at a local scale. The higher resolution also enables us to gain an insight into weather features like convective summer rainfall that happen at a scale smaller than the resolution of the coarser outputs, such as the 12km regional projections. This is particularly important with events like summer thunderstorms which can unleash huge volumes of rainfall such as the event which occurred in Boscastle, Cornwall, in 2004.”

At the heart of the development of the UKCP portfolio was the idea of a set of projections which could be used together, with each providing a slightly different view of the world. Professor Lowe said: “Within the UKCP suite of products there are a range of different tools to investigate the future. For instance, users interested in looking at the range of seasonal warming for different levels of greenhouse gas emissions might focus more on the probabilistic forecasts. Users interested in the large-scale drivers of a changing climate, including beyond the UK, might focus more on the global 60km resolution projections. Those most interested in extremes or sub-daily metrics can focus more on the 2.2km projections. Whichever strand of UKCP is the focus we typically recommend using several of the strands together to get the most complete picture of the future.”

Elements of UKCP use different views of how greenhouse gas emissions will change in the future, covering cases from big reductions in human-driven emissions to a case with large future increases in emissions. In other parts of UKCP – because the calculations are so computationally intensive – we have only been able to run one emission case. The UKCP local (2.2km) projections use the RCP8.5 emissions scenario, which relates to a change in global temperature of around 4.0 C by the 2070s, relative to the period 1981-2000. Jason Lowe added: “This does not mean this emission future is the most likely – the choice of scenario is still open for the world to make, and the majority of nations have pledged to aim to limit warming to well below 2.0 °C.

“When choosing which scenario to adopt for UKCP local (2.2km), it was agreed to use the higher RCP8.5 case. This is partly because risk-averse decisions, such as how to protect people from potentially dangerous flooding, often take a precautionary approach. It is also because choosing a high-emission scenario also allows users to estimate the response for lower levels of future global warming – for instance by scaling the projections or focusing on results earlier in the century.”

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Is Humberto on the way to the UK?

Description

At its most powerful Humberto was measured as a Category 3 Hurricane, but after leaving Bermuda and heading in to the cooler waters of the North Atlantic its intensity has waned.

Media reports have suggested that Humberto will reach the UK, bringing strong winds and heavy rain early next week. Is the story as simple and straightforward as that? As you may have guessed: no, not really.

Now as an ex-tropical system- heading north-eastwards across the north Atlantic, the former hurricane has become heavily modified to a point where it is now become wrapped into a new low-pressure system which only owes some of its origins to Humberto. Its influence will still be felt early next week when the low-pressure system approaches the UK, helping to push the current area of high-pressure eastwards, signalling an end to this week's pleasant conditions.

> We've had fine and settled conditions over the last few days ?? However, it will turn more unsettled this weekend ??
>
> The remnants of Hurricane #Humberto will then arrive on Monday as a deep area of low pressure ? with some #wet and #windy weather for the new working week ??? pic.twitter.com/lr3HGAeOVZ
>
> — Met Office (@metoffice) September 20, 2019

Hurricanes heavily influence the climate of the north Atlantic by drawing up moist air from the tropics. By the time they reach our shores, they often only provide a boost to home-grown low-pressure systems – they are actually an important mechanism for redistributing temperature. The waters of the North Atlantic are too cold to sustain the vast energy demands of a hurricane in full force, so by the time they reach our latitude they have lost their tropical ferocity and have frequently become heavily modified.

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